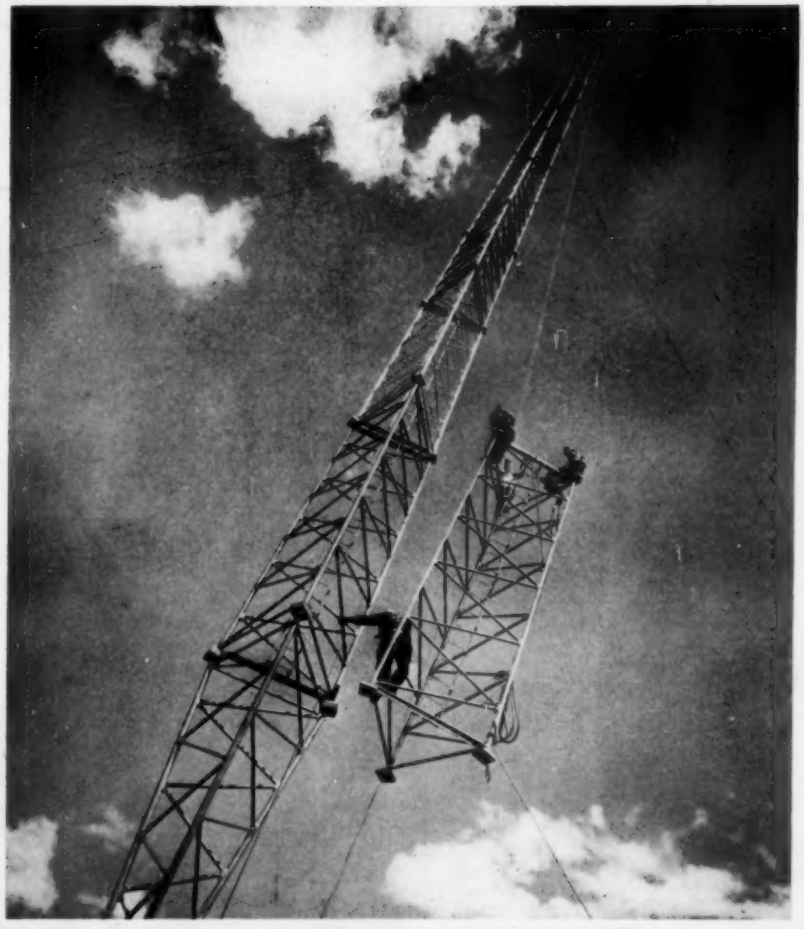
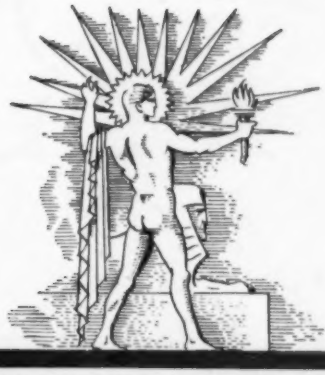
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •





February 12, 1938

Jumping-Off Place

See Page 108

A SCIENCE SERVICE PUBLICATION

Do You Know?

There are 54 active volcanoes in Japan.

It is estimated that insects destroy at least one-tenth of everything man grows.

Most young children like the flavor of cod liver oil or other fish oils, nursery schools observe.

Golden eagles still nest in North Dakota's badlands, but many are killed each winter because they prey on stock.

A British scientist suggests that the Romans seem to have twirled a spear when throwing it, to give the steadying advantage of axial spin.

The earliest treasury officials, as in ancient Egypt, had no money to handle, but had charge of farm products and other goods paid in taxes and tribute.

Non-breakable all-glass doors, that look like transparent partitions and open automatically by the electric-eye device, have been installed in a New York building.

Freak apples, having no seeds and exceptionally large for their variety, were produced last summer in a New Hampshire orchard, due to unusual weather conditions.

The speed of animals like the horse and deer is attributed by one anatomist to their rapid snap-kick stride, and most particularly to the lower bones of the leg being longer in proportion to the upper bones.

QUESTIONS DISCUSSED IN THIS ISSUE

Most articles which appear in SCIENCE NEWS LETTER *are based on communications to Science Service, or on papers before meetings. Where published sources are used they are referred to in the article.*

ARCHAEOLOGY

What do Indians think of white grave-robbers? page 100.

Of what use was a speaking tube in an ancient temple? page 109.

BIOCHEMISTRY

How many proteins are there? page 99.

CHEMISTRY

What is an ionic treadmill? page 109.

CLIMATOLOGY

Where are years of drought due? page 106.

ENGINEERING

How much money might a Public Works Department save the Government? page 104.

EUGENICS

Why do intelligent men marry early? page 104.

FLORICULTURE

Under what climatic conditions do most house plants live? page 110.

FORESTRY

What proportion of forest fires are of incendiary origin? page 110.

GEOLOGY

Where was the Yellowstone River before the Ice Age? page 110.

HISTORY OF MEDICINE

Where did quinine gets its name? page 105.

INVENTION

How will the "funnies" find voices? page 105.

MATHEMATICS

How many googols in a googolplex? page 108.

MINING

How much of our coal is now processed? page 108.

NAVAL ARCHITECTURE

Why may new liners be without smokestacks? page 105.

OCEANOGRAPHY

How much of the earth's surface is still unexplored? page 102.

PHARMACY

How may war in the Far East affect your head colds? page 101.

PHOTOGRAPHY

When will color films be ready for use in any camera? page 109.

PHYSICS

How does the new electron furnace work? page 107.

PSYCHOLOGY

Why are clever men intractable? page 100.

PUBLIC HEALTH

What diseases are now on the increase? page 105.

SEISMOLOGY

How did the Hawaii earthquake records come to Washington? page 104.

How far away was the New Guinea earthquake felt? page 104.

A new, secret-formula glue makes electric-copper sheeting stick smoothly to walls.

"No cold is a slight cold," warns a New York physician, pointing out that pneumonia usually begins with a cold.

The ten-cent perfume of today surpasses that for which caravans formerly risked their lives.

Children often acquire fear of dogs, insects, or darkness because they see adults showing fear of such things.

SCIENCE NEWS LETTER

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BIOCHEMISTRY

Building Blocks of Life Ruled by the Number 288

This Number and Its Multiples Found Everywhere In Groupings of Amino Acids to Form Proteins

By ROBERT D. POTTER

THE BIBLICAL number typifying man's length of life may be three score years and ten but the chemical number which permits him to attain that age is 288.

The chemical bonding of vital protein —basis of all living matter—is bound up with the cryptic number 288, Dr. Max Bergmann, research scientist from the Rockefeller Institute for Medical Research, New York City, disclosed before the recent meetings of the American Chemical Society in Richmond. Not only is 288 a number intimately connected with life itself in the higher animals—including man—but it is a number closely related with heredity and the ability of parents to transmit physical characteristics to their offspring.

On Chemical Basis

Predetermination, said Dr. Bergmann, now takes on a new and understandable chemical basis instead of an interpretation of heredity in terms of chromosomes. Scientists called the chromosomes and the genes they contain, the bearers to posterity of the physical characteristics of those now living. But the names chromosomes and genes were after all but names rather than explanations of why they were endowed with their remarkable abilities.

The tissues of animals and man, besides containing a vast amount of water, consist mainly of proteins. Yet the structure of no single one of these basic, life-bearing proteins is exactly known, said Dr. Bergmann.

The trouble has been, he indicated, that proteins are the giants among chemical molecules. They owe their gigantic size to the complicated assembly of smaller chemical units which somehow form chemical families that are essential to life. The number 288 has recently been discovered, in Dr. Bergmann's laboratory, to enter into the chemical rules which determine how such complex molecular organizations are put together.

Chemical aggregates known as the amino acids for a long time have been known to be members of the huge protein molecules, declared Dr. Bergmann. But the new finding is that in the protein contained in the chicken egg there exist groups of 288 of these amino acids. And in the protein found in the hemoglobin of cattle 576 amino units make up the molecule. This, significantly, is twice the cryptic number 288. Similarly the fiber protein of cattle blood contains 576 amino units, while the fiber protein that makes natural silk contains 2,592 amino units; or nine times the basic number 288.

Protein Specificity

It was formerly thought, said Dr. Bergmann, that an almost infinite variety of proteins could exist. Dr. Emil Fischer, German Nobelist, had advanced such a theory whose implications pictured a protein for the hair of man, a different one for the hair of a dog, another for sheep hair and so on for each species of animal. And then the whole process was repeated for proteins in any other part of the body, again throughout the whole animal and plant kingdoms. By varying the combinations of only 30 amino acids, for example, it was possible to postulate the existence of 1,280,000,000,000,000,000,000,000,000 different proteins; or a number equal to 128 followed by 28 ciphers.

Analysis in Dr. Bergmann's laboratory, however, has brought new order out of this apparently jumbled picture. The only protein combinations permitted to exist in nature consist of those containing 288 amino units, or some simple whole number multiple of 288.

Out of his work, Dr. Bergmann has been able to fashion what might be called a mathematical rule for life, or at least the vital protein part of it.

Formula For a Molecule

Says Dr. Bergmann:

"Proteins appear to contain $2^m \times 3^n$ units per molecule, where m and n are whole positive numbers."

Higher animals, including man, are unable to build up the basic units of protein, but make them available by digesting food proteins by means of enzymes in the gastro-intestinal tract, such as pepsin and trypsin. Plants, in other words, have long been known to fashion the complex protein arrangements and man, by digestion, breaks these larger building blocks into usable pieces.

The first step in the new knowledge was the creation in Dr. Bergmann's laboratory of relatively simple peptide-like substances serving as simple protein models with which could be studied the action of the various enzymes. It was by the study of these synthetic protein models that the amazing regularity of 288 and multiples of 288 appeared.

Gradually it became apparent that enzymes had specific duties to perform and that, in fact, each kind of protein is created by the action of its specific enzyme. This fact, said Dr. Bergmann, is a new understanding of body chemistry for it had previously been supposed

CITIZENS OF THE MOON

It has been suggested that if any life larger than bacteria could exist on the arid, airless face of the moon, alternately baked in sunlight and frozen in darkness, it might be lichens. On earth, these strange plant communities endure where other plants perish, so if there are even crumbs of oxygen and moisture on our satellite, such things as these might conceivably live there.

that the action of the enzymes was to break down complex proteins into those the body could use. Now enzymes take on the new role of permitting—indeed determining—the building up of body proteins.

Sequence of Reactions

The mechanism of creating the complex proteins, said Dr. Bergmann, now appears to be a sequence of many, many reactions wherein a simple protein is turned, by specific enzymes, into a more complex protein.

The whole chain of reactions therefore goes on until finally a protein is created which does not have present the specific enzyme that can build it higher, and there the chain stops.

"Thus the specificity of an individual enzyme predetermines the molecular pattern of the protein synthesized by this enzyme. The numerical rules governing a protein molecule have their basis in the specificity of the enzyme involved," declared Dr. Bergmann. "Here we arrive, for the first time, at a physicochemical concept of the predetermination which is an inherent attribute of many phenomena of life.

Set of Chemical Tools

"The question has frequently been discussed whether hereditary phenomena are connected with, and explained by, a transmission of individual proteins and in particular, whether the chromosomes are proteins. On the basis of the conclusion which we have reached I think you will agree that the essential substances transmitted from one generation of cells to the next, from parents to children, must be enzymes and that they have to be enzymes with the capability of synthesizing individual proteins by predetermined sequences of specific reactions."

What Dr. Bergmann is saying here—to use an analogy—is that heredity consists of passing on, from one generation to another, a set of chemical tools which permit the offspring to fashion the proteins they will encounter in life in only certain ways. These chemical tools, of course, are specific sets of enzymes.

If you, for example, have red hair it means that heredity handed on to you the enzymes which permit your body to change the food you eat into proteins that occur in red hair pigment. Dark-haired people have a different set of enzyme tools which enables them to fashion dark hair pigment out of the same foods which you both eat. Similar examples can be found in the color of the eyes and other physical characteristics.

"Will we ever be able to copy in life the synthesis of natural proteins?" asks Dr. Bergman. "I do not know whether we shall succeed sooner or later (probably later) in synthesizing proteins without the cooperation of living cells and only with the aid of enzymes. However, I am doubtful how much a synthesis would add to our understanding of protein chemistry and life phenomena. At the present moment it seems to me to be of still greater significance that we have available methods to study the compositions and transformations of proteins and the specific action of protein-creating enzymes with the same precision as in the case of simpler substances and simpler phenomena."

Science News Letter, February 12, 1938

PSYCHOLOGY

More Intelligent Men Not Always Best Citizens

AMONG humans, a certain amount of intelligence appears to be essential to good citizenship. The idiot cannot become a satisfactory member of the social group.

At the other end of the intellectual scale, the genius contributes greatly to social life. But in between these two extremes, the level of intelligence does not seem to parallel the level of socialization.

Human social organization depends upon intelligence and not upon instinct as does the social life of ants or termites, it is pointed out by a psychologist, Dr. F. L. Wells of Harvard, but, he explains, beyond that certain minimum needed to learn how to get on in the world, a higher average intelligence does not necessarily mean less crime or less anti-social conduct.

Modern technological developments have made possible the automobile, the telephone, and the airplane serving to bring men closer together. But they have also made possible the instruments of modern warfare and crime. The automobile may serve as a weapon of crime as well as a socializing influence.

Against Restraints

The individual who is mentally alert and of inventive mind is likely to chafe against the restraints of society and discover means of escaping them.

The more mentally gifted, if also possessed of a lust for power, are apt to exploit the less intelligent members of the community.

Humanity would benefit most, Dr. Wells believes, not from a raising of the average of the intelligence, but from a more equable distribution of all human traits with fewer extremes in ability to adjust to the general pattern of life.

Men need ability to restrain and sublimate their emotional and animal desires. With a proper balance between natural drives, intelligence, and sublimation, great individuals and great communities can develop.

If a people were under a large-scale administration equal in competence to that of a well-run hospital, Dr. Wells declared, it should be possible to attain a harmony of individual difference, liberty, and order necessary for the mental hygiene of society.

Science News Letter, February 12, 1938

ARCHAEOLOGY

Indian Chiefs Protest Uncivilized Pot-Hunting

INDIAN CHIEFS don't like the robbing of Indian graves by white men. It's "uncivilized."

In a protest, drawn up in formal fashion, a group of Seneca chiefs have expressed forthright ideas on what is proper in archaeology, and what is not.

Summed up briefly, they approve of scientific excavations by trained experts, who are seeking prehistory.

They do not approve of ignorant and commercial relic hunting in their state, which happens to be New York.

The Indians themselves put it this way: "We have no objection to the scientific examinations of qualified museums known to and approved by the National Research Council or of the Society for American Archaeology, or to individual scientists who keep careful records of a type having the approval of scientific bodies. Methodical and purposeful work adds to the sum of the world's knowledge, but the grave robbery of 'pot-hunters' and relic diggers is repugnant to every person understanding

the value of the material history that our ancestors wrote into the soil of Mother Earth."

The Senecas have even stronger words to add about commercial relic hunters, who dig at Indian village sites and graves: "We protest that this work has no justification, that it is robbing America of the only remaining source of her prehistory, and is an uncivilized affront to the memory of our forefathers."

The Neighborhood Indian Society of Rochester, which adopted the resolution, is using it to petition state officials of New York to enact laws. They want laws forbidding excavations by "untrained, unregistered, and unlicensed persons."

Archaeologists who have spent years studying their specialized science in universities, would echo the Seneca protest. They themselves have protested against the wrecking of Indian sites by unskilled diggers. Any site once damaged becomes a blurred or unreadable page of our ancient history, lost forever.

Science News Letter, February 12, 1938

GLORY THAT WAS NOT GREECE

Asia Minor did not have to await the coming of the Greeks to show forth beauty in stone. The Hittites in their day were a folk of high culture, as witness this exquisitely carved column base, found in the porch of a Hittite palace of the eighth century B. C. at Tell Tainat in North Syria by an expedition of the Oriental Institute of Chicago.

PHARMACY

Ephedra, Valuable Drug, Can be Grown on Badlands

500 Acres of Now Worthless Soil Able to Produce Crop For Whole American Market if War Stops Chinese Supply

THE DAKOTA Badlands may never have been good for much before, but if fighting continues in China, this unproductive region of our own country may get a chance to redeem its reputation by making the United States independent of outside sources of an important medicine.

This medicine is ephedrine, valuable aid to asthma and hay fever sufferers and important ingredient of the solutions you drop or spray into your nose to relieve the miserable congestion and stuffiness of a cold. Ephedrine is obtained from the Chinese plant, ma huang or ephedra. In 1935 the United States imported 2,000,000 pounds of the little green ephedra stems for making nose drops, eye drops, capsules to relieve low blood pressure and various other medical uses. The next year the crop was bad and imports fell to 1,000,000 pounds. Only 700,000 pounds were obtained during the first ten months of 1937.

Manufacturers Worried

Drug manufacturers, worried over possibility of even worse reduction in the supply of ephedra, saw hope in the announcement by the U. S. Bureau of Foreign and Domestic Commerce that three German firms are manufacturing synthetic ephedrine.

Even better seems a report to the American Pharmaceutical Association which forecasts complete independence of outside sources of ephedrine. The ephedra plant itself has been cultivated successfully in the medicinal plant garden of the South Dakota State College at Brookings. The men responsible for this achievement are Dr. B. V. Christensen, director of the University of Florida School of Pharmacy, and Prof. Lovell D. Hiner of South Dakota State College.

The plants were grown from seeds obtained from the Peking Union Medical College and were first cultivated in the South Dakota college's greenhouses. Later they were transplanted to the medicinal plant garden where they survived the "ghastly black blizzard," when the average annual rainfall was not more than a dozen inches, and the fierce winter of 1935-1936, pronounced the coldest for South Dakota in 50 years. Because the plants survived the drought so well, a test planting was made in the Badlands section of the state. The plants grew and were healthy even in this unproductive region, and although smaller than those in the college's garden, they yielded just as much of the drug, ephedrine.

At first the ephedrine yield—pharmacologists call it assay—of the plants was not very high but further cultivation has brought the assay up to that of the imported Chinese ephedra stems.

Emergency Production

Cultivation has not yet reached a commercial scale but Dr. Hiner has reported that several hundred pounds can now be cut from American-grown ephedra plants, and that "in case of emergency, ephedra of fair quality could be produced in South Dakota."

The plant itself is a low, bushy growth that appears to be all stems. Actually the leaves are there but have degenerated into scales. The medicine is obtained from the stems. The plant spreads something like grass by sending out underground stems or roots. In the course of two years one plant will grow to cover an area the size of a bushel basket. Dr. Hiner was able to obtain about two tons of ephedra from an acre, which means that the entire supply for the United States could be grown on some 500 acres of Dakota Badlands.

Labor Costs High

Cultivation of ephedra might be a successful venture during war or emergency that threatens to cut off outside supplies. At other times, however, it would not be successful financially. Officials of the American Pharmaceutical Association point out that in this case, as in the case of many other medicinal plants, the cost of labor would make American cultivation unprofitable if the plants could be obtained from other countries.

Science News Letter, February 12, 1938

OCEANOGRAPHY

Stealing Neptune's Secrets

Three-Quarters of Earth's Surface Still Unexplored But Scientists Are at Last Mapping Ocean's Depths

By RONALD L. IVES

THE EARTH, we like to tell ourselves, is now pretty thoroughly explored. Gone are the naive pre-Columbian days, when whole continents lay unsuspected beyond the seas. Gone are the secrets of the Poles; they have become mere winter resorts for hardy Russians. Darkest Africa is dark no longer; it is crisscrossed with motor roads. The drone of aircraft motors is heard daily over South America's steaming jungles and towering volcanic peaks.

Yet three-quarters of the surface of the earth's crust is still *terra incognita* to us. We know hardly more about the mountains and canyons, the rocks and sands of the ocean bottom than Alexander the Great knew about Iceland.

We have made some few faint scratches on the great areas on the map that are still shown in blank blue. Soundings have given rough ideas of the shape of the sea bottom along coasts and near harbors, especially where the bottom comes too close to the top, and menaces navigation. Venturesome souls have gone down as much as 500 feet in specially-built diving armor, and to a half mile in a bathysphere. But this is only dipping beneath the surface film. Some of the real deeps in the ocean go farther below sea level than Mount Everest rises above it!

Exploring the Unseen

Although it is quite unlikely that men will ever walk the bottoms of these Titan-drowning abysses, as Jules Verne once fancied they might, nevertheless we are going to learn about them. The blank spaces on the map are some day going to show the close-spaced contour lines that spell hills and valleys to him who knows how to read. And geologists are going to tell us what those hills and valleys are made of.

It's all done with machines. Scientists are ingenious folk; difficulties don't bother them much. If they want to know, they find out. And if they can't get to the "find out" place in person, they invent machines to do the job for them.

More than a century ago, mariners learned that the sands and gravels on the sea bottom were not everywhere the same. A blob of wax on the bottom of the sounding lead brought up sometimes gravel, sometimes sand, occasionally mud. By mapping the sea bottom sediments at different depths, they were able to navigate in dense fogs.

Later, trawlings brought up more sea bottom samples. Small meteorites and the bones of a baby dinosaur were dragged up from the bottom of the sea. What else was there? Diving suits were invented, and the frantic, often futile, attempts to recover the gold in sunken ships began.

Lost Appalachia

Then, only a few years ago, geologists found that certain mountain ranges were built of sediments that must have been washed away from ancient mountains. Tracing the ancient mountains, they found that they must have risen out of what is now the deep sea. Our Appalachian mountains are a good example. Their sediments must have come from an ancient hypothetical land mass called Appalachia. Where was Appalachia? Under the sea, off the Atlantic coast.

Long ago, when the first transatlantic cables were laid, engineers studied and mapped the profile of the sea bottom between Nova Scotia and Ireland. The sea floor was not flat, but had mountains and valleys just like the land. Later findings showed a ridge running the whole length of the Atlantic, from Iceland to east of Cape Horn. Was this the vanished Atlantis, or was it the ridge left when America broke loose from the eastern continents, before they drifted, or slid apart?

Structures under the sea, like the folds of land rocks; granite masses projecting upward through sandstones; great breaks in the bedrock, exposing older beds—these would give the answers. How should they be located? Certainly, wax on a sounding lead wouldn't give any indications of geologic structures, and when a thin layer of mud covered the rock of the sea floor the wax only brought up mud, giving no indication of the slightly-buried bedrock.

First, because it was most important, and because some studies had already been made, the geologists worked out new methods of finding the depth of the sea at any place. The old method, in which miles of cable, with a weight attached to the end, were reeled overside until the weight touched bottom, was too slow and costly. A day or more might be consumed in making one sounding; and when it is recalled that there are 140,000,000 square miles of sea, the hopelessness of getting a clear idea of the topography of the sea floor in any reasonable time, or at any reasonable cost, will be realized.

Cables used in the soundings sometime broke under their own weight. It takes a very strong steel piano wire to hold up the weight of six miles of its length. Soundings taken every mile might very well miss important deep sea structures. A canyon three-quarters of a mile wide might be missed completely by the old method. Tapered cables, becoming thicker near the top, solved part of the breakage problem, but they didn't reduce the time necessary for the making of a sounding. Something else had to be devised.

Sound in Water

Searching for a clue, scientists remembered that sound travels with a constant speed in water. Sound also reflects when the waves reach a hard surface. Why not send a sound wave down from a ship, record the time lapsed between sending it out and receiving the echo, and calculate the depth of the sea? Surely, if a car travels thirty miles an hour, exactly, for ten hours, it has gone 300 miles. If this is the round trip time to somewhere, the place is 150 miles away. Using the same reasoning, they developed a sonic depth finder that can make depth determinations in about as many seconds as the old cable-and-weight method took hours.

Using this sonic depth finder, accurate maps were made of the mouths of the important rivers of the world, and strange canyons, some of them as large as the Grand Canyon of Colorado, were found under the sea. Then, seeking more worlds to conquer, the geologists, most of them working in cooperation

with the U. S. Coast and Geodetic Survey, went farther out to sea, explored the bottom of the Pacific, and found that the roughnesses of the sea floor were even greater than the older methods had shown. There are real mountains and valleys under the seas, just as there are on land.

Studies of submarine landscapes are still going on, and still producing surprising and astounding information each season.

While one group of researchers was finding out the shape of the sea floor, another was trying to find out just what rocks it was made of. From this, they hoped to determine just what had happened in the past. Some of this geologic history can be learned from studies of the continents, but the materials washed out to sea in the geologic past are, in general, still there, and only in the depths of the sea can good records of them be found.

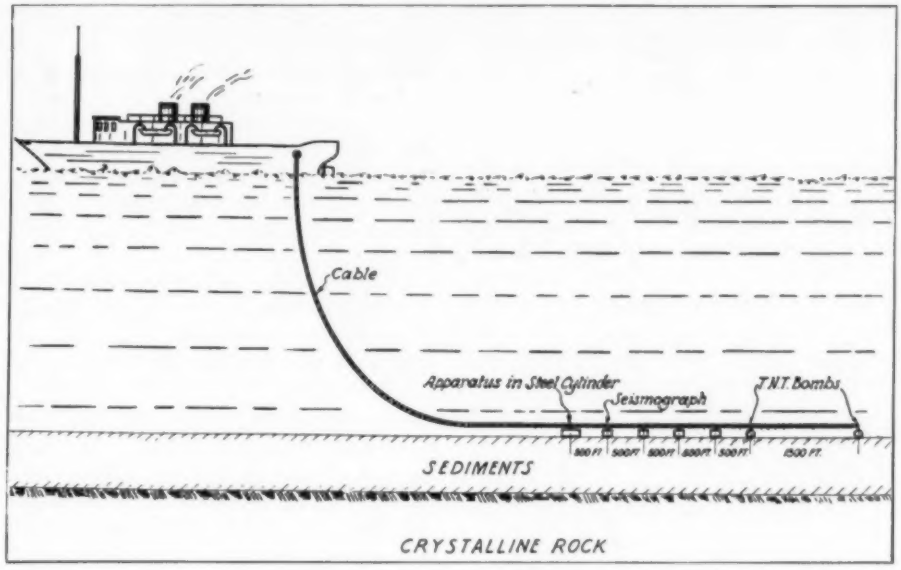
The first attempts at study of the sea bottom after the waxed weight method was made with an automatic "clamshell" bucket, hung below a sounding weight. Triggered like a mousetrap, the clamshell snapped out a sample of the sea bottom when it touched. This, while very successful, did not tell anything of the deeper rocks on the sea floor. Rock more than a few inches down could not be bitten out by any clamshell that could be made. Something else was necessary. What?

Punching Out Cylinders

Certainly, if a cylinder of the sea bottom, say ten feet long, could be drilled out, and brought to the surface, it would reveal much information unavailable by other methods. Geologists on land were already using this method regularly. They called it core drilling. Land methods, however, couldn't be used under the sea. Gasoline engines need air, and electrical equipment couldn't be made to work under the enormous pressures three miles down.

Drilling makes holes—so does punching! Why not punch out the cores with one giant blow, instead of slowly drilling them out? Dr. Charles Piggot, Carnegie Institution of Washington geophysicist, designed a "gun" to punch out the specimens. Using a powerful explosive charge to drive the core tube deep into the sea floor seemed to be the best scheme.

Experimental models didn't work as planned. The gun fired when it touched bottom, but it didn't bring up any core. Something must be wrong—something was! Under great pressure, water doesn't flow very well, and the water in the core tube wouldn't move out to let the rock particles move in.



TRAP FOR WAVES IN BOTTOM ROCK

Diagram shows apparatus designed by Dr. Maurice Ewing, Lehigh University physicist, for producing and studying sea floor artificial earthquakes three miles below the surface. Vibrations set up in the rock by the explosion of the bombs are recorded by the seismographs. All this works automatically after it is lowered to the sea floor.

Ever dive wrong, and land flat? Remember how hard the water was? That's how it acted in the core tube. Redesigning the tube so that the water could escape allowed the tube to be driven into the sea floor, but then it wouldn't pull out. Something else was wrong. When the cable pulled on the core tube, a vacuum was made under it, and it wouldn't pull out of the hole that it had punched in the sea bottom. Another set of openings, to let water back into the hole as the punch was pulled out, stopped this trouble.

Later, a thin brass tube was placed inside the punch part of the core gun. When the gun, with its core inside, was pulled to the surface, the brass tube containing the core could be easily removed from the gun, and used for a packing container until the ship docked.

Tracing Glaciations

Last summer, using this gun, and traveling aboard a cable repair ship borrowed for the purpose, Dr. Piggot took eleven samples of the sea bottom between America and Europe. Later, when the U. S. Geological Survey checked his cores, they found evidence of four ice ages, four warm periods, and two eras of violent volcanic activity. Measuring the cores, and checking the length of the most recent warm period at sea with that of the same period on land, they found that 200,000 years or so of geologic history was recorded in the ten-foot cores. Now Dr. Piggot plans to make a 15-foot core gun, which may extend the range of studies 100,000 years or so.

While the rocks themselves were being studied, the structures, like worn-away mountain ranges, filled river valleys, and volcanic beds, believed to be present under the sea, were not neglected. Geologists knew, from land studies, that certain rocks were heavier than others.

Pull on a Pendulum

If a pendulum clock is placed in an area underlain by abnormally heavy rocks, it will run fast, while if the rocks are abnormally light, the clock will be slow. This is the principle of the gravity method of structure determination used in the hunt for oil fields. Why not apply it to sea studies? Troubles arose. A ship at sea rolled—it couldn't be fastened down very firmly. It might drift. In short, it wasn't a very good station for gravity observations.

Dr. A. Vening Meinesz, Dutch geophysicist, decided that a submarine would be a better ocean laboratory than a ship. It could submerge, escaping the annoying surface disturbances. Designing a special pendulum clock which could not be greatly influenced by slight motion of the sub- (*Turn to page 106*)

ENGINEERING

Public Works Department Urged as Budget Saver

A SEPARATE and new branch of the government, a Federal Department of Public Works, was urged by speakers addressing the American Society of Civil Engineers in New York.

In normal prosperity years construction is the second largest industry in the nation. From 1926 to 1933 the yearly average expenditure for construction was $9,000,000,000, and directly or indirectly employed five million men. As the bottom dropped out of private construction, the federal government through WPA and many other agencies stepped into the breach and gradually assumed a larger and larger place in the nation's construction industry.

The function of a Department of Public Works, said Alonzo J. Hammond, Chicago consulting engineer and a past president of the Society, would be to coordinate and effect economies in the ramified building activity of the government which is now scattered through many departments. Surveys made in the past estimate that $50,000,000 might be saved for every billion dollars spent for public works by a unified and coordinating control. Virtually every type of building by the government, except the military works of the War Department, would be in the province of the proposed department.

Back in 1924, said Mr. Hammond, representatives of 60 separate engineering organizations met in Washington and recommended such a department. Herbert Hoover, then Secretary of Commerce, urged the formation of the department not only because it affected saving in planning and operation costs but also because its value "would be more in leadership for the great balance wheel of construction which lay in government construction work."

Science News Letter, February 12, 1938

SEISMOLOGY

Hawaii Earthquake Records Fly Nearly 5,000 Miles

SPED through the air via clipper plane to San Francisco, thence by transcontinental mail plane to Washington, photographic copies of the seismograph records of the Hawaiian earthquake were recently received by the scientists of the U. S. Coast and Geodetic Survey. The copies left Honolulu on Tuesday, Jan. 25, and were delivered to the Survey at the opening of the business day, Friday, Jan. 28. Shortest map distance for the flight is 4,800 miles; actual travel distance is probably somewhat greater.

The records came from two seismological observatories in Hawaii: the Hawaiian Volcano Observatory and the station of the U. S. Coast and Geodetic Survey on the campus of the University of Hawaii.

Study of the wiggly lines enabled the Survey seismologists to spot in the epicenter of the earthquake with new accuracy. It was located about thirty miles northeast of the island of Maui.

Science News Letter, February 12, 1938

SEISMOLOGY

Violent Earthquake Occurs In Western New Guinea

VIOLENT earthquake shocks wrenched the western end of the island of New Guinea in the East Indies early on the morning of Wednesday, Feb. 2.

Seismologists of the U. S. Coast and Geodetic Survey, after examining data collected by Science Service, stated that they believed great loss of life, with destruction of native towns and fishing craft, must have occurred. The disturbance was felt as far away as the northern coast of Australia.

Direct dispatches by cable and radio often lag many days behind instrumental reports, when a severe earthquake occurs in an out-of-the-way place.

The epicenter was determined as in latitude 4 degrees south, longitude 132.5 degrees east, near the coast of the Banda Sea. Time of origin was 4:04.4 a. m., local time, or 2:04.4 a. m., on Tuesday, Feb. 1, on the Eastern Standard Time basis.

A large number of observatories, including three in the Pacific Ocean area, transmitted their reports to Science Service. They were as follows: Manila, P. I., Observatory; Zikawei, China, Observatory (near Shanghai, transmitted via Manila); the British observatory at Apia, Samoa; Dominion Observatory, Ottawa, Ont.; Dominion Meteorological Observatory, Victoria, B. C.; the University of California, Berkeley, Calif.; Pennsylvania State College; the University of Montana; the Franklin Institute, Philadelphia; stations of the Jesuit Seismological Association at St. Louis University, Georgetown University, Fordham University, and Canisius College; and the observatories of the U. S. Coast and Geodetic Survey at Tucson, Ariz., and Honolulu, T. H.

Science News Letter, February 12, 1938

IN SCIENC

EUGENICS

Earlier Marriage Is Rule Among Intelligent Men

ALL SORTS of things have been boosted as aids to romance—everything from soap to sock supporters. Add now: Phi Beta Kappa keys.

The most intelligent of a large group of college graduates investigated statistically by Dr. Raymond R. Willoughby of Brown University married earlier and had more children than their lower-browed classmates (*Science*, Jan. 28.) Of the "high" group, 9 per cent. were already married at 23 years of age, while only 4 per cent. of the "low" group had taken mates. At 29 years, 40 per cent. of the "high" group were still bachelors, but 52 per cent. of the "lows" were also on the waiting list.

Causes? Dr. Willoughby will not commit himself flat-footedly. He suggests:

"One may speculate that they marry earlier because their superior intelligence enables them to establish themselves economically earlier—although it seems remarkable that differences as small as those between high and low scoring college men, and in a trait with such limited correlations with practical abilities, should be as effective as this."

Science News Letter, February 12, 1938

ENGINEERING

Bombproof Power Plants For European Industries

BOMBPROOF power plants are being constructed to serve some of Europe's chemical and munitions plants. A typical one, comprising high-pressure boilers and a small but powerful steam turbine generator set, is set into a tunnel driven into the face of a cliff.

These plants are not intended for immediate use. They are maintained in stand-by condition until emergency demands their operation. It is even possible to arrange automatic valve systems so that if enemy bombing puts the outdoor plant out of commission the bombproofed reserve plant goes into action at once.

Science News Letter, February 12, 1938

NCE FIELDS

PUBLIC HEALTH

It's a Measles Year; Smallpox Also High

IT'S A MEASLES year. A survey just issued by the U. S. Public Health Service shows that almost five times as much measles occurred throughout the country during the last four weeks of 1937 as during the same period of 1936. The number of cases is still increasing. For the week ending Jan. 15, latest on which figures are available, there were nearly 16,000 cases, an increase of 300 cases over the week ending Jan. 8, and half as many cases as the high figure for the total cases in December, 1937.

Smallpox is also on the increase and is especially prevalent in the midwest. For the week ending Jan. 15, there were 727 cases throughout the country, as compared with 315 cases during the corresponding week last year. The number of smallpox cases reported for the last four weeks of 1937 was 1,338. This is the highest number recorded for the month of December in the last 6 years.

Smallpox can be prevented by vaccination.

Science News Letter, February 12, 1938

HISTORY OF MEDICINE

Second Tercentenary Of Quinine Celebrated

THE 300th anniversary of the first recognized use of cinchona for malaria is probably going to be celebrated throughout the world this month although the same 300th anniversary was also celebrated nearly eight years ago in St. Louis.

Since cinchona has given mankind quinine, sovereign remedy for that ancient and disastrous plague of chills and fever, malaria, no one is likely to begrudge it a second 300th anniversary celebration.

The present celebration will mark the 300th year since Countess Ana de Chinchon, wife of the viceroy of Peru, was cured of intermittent fever by means of the bark which ever since has borne her name, cinchona. Records in the Missouri Botanical Garden at St. Louis show that eight years earlier, in 1630, the Spanish corregidor, Don Juan Lopez de Canizares, was cured of the intermittent fever by the use of this same cinchona bark. In fact, it was this corregidor who, learning of the illness of the Countess, sent a package of the powdered bark to her physician. The Missouri Botanical Garden consequently staged a cinchona celebration in 1930.

The Peruvian Indians had known of the bark's value as a remedy for the fever we call malaria long before 1638 or even 1630. They called the bark "quinaquina" which gave quinine its name when that medicine was isolated from the cinchona bark in 1820.

The discovery of the way malaria is spread by certain kinds of mosquitoes has made it possible to bring the disease under control to some extent, but malaria is still a scourge in many parts of the world. The League of Nations Malaria Commission therefore recently announced that it officially advises a daily dose of quinine as malaria preventive during the malaria season in those regions where the disease is prevalent.

Science News Letter, February 12, 1938

INVENTION

New Cheap Records Make "Talkies" of "Funnies"

A METHOD for making cheap phonograph records for distribution with newspapers, as the sound part of comic strips and other features appealing to children, has been patented. William G. H. Finch of New York City is the inventor. His patent, No. 2,106,245, covers a scheme for manufacturing the records on mats at high speed.

Sacrificing high fidelity reproduction and durability for cheapness of processing, Mr. Finch's method involves making the record exactly as an ordinary phonograph record except that a dull stylus would be used in order to get a broad track so that mat flong (a material used to prepare stereotype reproductions of type for simultaneous printing on several presses) could be used as the record material.

"The newspaper sound record supplement," Mr. Finch declares, "is particularly suitable for 'reading' the comic strips to youngsters or to convey the actual speech intended by each character of the comic strip in the proper sequence for enacting the scenes of the strip."

The records would be discarded after being played through once or twice, the inventor suggests. They can be played on any standard phonograph, it is claimed.

Science News Letter, February 12, 1938

NAVAL ARCHITECTURE

New American Liners May Be Built Without Stacks

THE LONG awaited luxury liner minus the traditional smokestacks may make its appearance in American ports some day in the three merchant vessels adapted for conversion to aircraft carriers in war time, proposed by the U. S. Maritime Commission.

Marine engineers, should the three ships actually be designed and built, may resort to blowers to force smoke out vents in the stern or sides of the ship in place of the customary aircraft carrier island, Admiral Emory S. Land, member of the commission, stated. Center smokestacks of the conventional type are eliminated because of the need for a clear landing space.

Such an approach is only one of the many novel features vessels of this type would possess, Admiral Land stated.

A superstructure with a large top deck readily convertible into a landing deck would be a requisite, he stated. The ship's center of gravity would have to be low so as to give the ship stability when the topheavy landing deck is put on, he pointed out.

The Maritime Commission is interested in the possibility of building three such ships for the United States-South America east coast trade. No designs have as yet, however, been completed, it was stated. Long of hull, wide of beam and speedy, the vessels would cost about $17,500,000 apiece.

Science News Letter, February 12, 1938

PARASITOLOGY

Sulphur Doses Rid Fowls Of External Parasites

SULPHUR, standby spring tonic of the old-time medicine chest, is good for what ails chickens on the outside, it appears from results of experiments conducted by Dr. M. W. Emmel of the Florida Experiment Station.

Dr. Emmel has found that by adding five per cent. of sulphur flour to the chickens' laying mash he can rid the birds of external parasites such as lice and stick-tight fleas.

Sunshine proved to be a strong auxiliary for the sulphur in the experiments. Fowls kept on the sulphur regimen indoors were relieved of only 25 per cent. of their parasites. When sulphur-fed fowls were given liberty to run outdoors, however, they were totally cleared of their infestation.

Science News Letter, February 12, 1938

From Page 103

marine, Dr. Meinesz dived into the Atlantic's depths, and later came forth with information that Cuba, one range of the Andes, and part of Mexico are geologically connected.

Undersea extensions of the great areas where earthquake movements and volcanic eruptions are most common have already been found, and the studies are only beginning.

Working from the data already at hand, Dr. Richard M. Field of Princeton University's department of geology suggested that there might be, under the Atlantic, a great ancient foundered continent, complete with hills and valleys, river beds and plateaus, just like any other continent. Under this theory, the great mid-Atlantic ridge might very well have once been that continent's backbone.

Artificial Earthquakes

New methods of study are already at hand. Dr. Maurice Ewing, Lehigh University physicist, recently announced the successful completion of a series of machines for creating sea-floor earthquakes and studying them. Geologists on land, from studies of the waves of natural and artificial earthquakes, can locate structures buried too deeply to be found from any surface indications. At sea, the problem is more difficult, but if instruments could be placed on the sea bottom, there was no reason why the same facts might not be learned from them.

Dr. Ewing's problem was very simple. Just work out a way of using the machines several miles below the surface. Easy—well, not quite. Everything had to operate automatically, three miles below the surface. Recently, using instruments and bombs strung out along a cable, which can be lowered to the sea floor, and which will work without human attention after they are in place.

Chemical Oceanography

Dr. Ewing found that the method actually could be made to work in practice. Time bombs, instead of being dread instruments of destruction in wartime, have become useful scientific instruments.

Chemical action in the oceanic depths also interests geologists, who hope to learn from its study just why oceanic deposits differ from land deposits. Perhaps we have, tucked away in some field notebook, the unrecognized evidence of an ancient sea that is now dry land.

NOT VERY EASY

Scientific work is sometimes hard labor. Here, sweating scientists are dragging the bit of a deep sea core gun aboard their ship. Later, the core will be taken out, dried, and carefully kept for study ashore at the end of the field season.

Radium in the sea's depths is present in greater quantities than in any ordinary rock on the land. Microscopic life forms, like those that collect iron and manganese, may, far under the sea, absorb radium, causing this great concentration. Other minerals are present in quantities that are hard to explain. Gold, long known to be present in the sea, is only one of the many minerals that dissolve in sea water—given enough time.

Subsea research is the most recent and until a few years ago the most neglected geologic field. Many generations of work will be necessary before the depths of the sea are as well known as the land areas, but with their clever and costly remote-control instruments, the geologists, geophysicists and oceanographers are recovering lost chapters in earth's history from Davy Jones' Locker.

Science News Letter, February 12, 1938

CLIMATOLOGY

Years of Drought Coming To Great Basin, is Warning

YEARS of drought, like the seven lean years of Joseph's Egypt, are due to grip the Great Basin area of the West, Dr. Ernst Antevs of the Carnegie Institution of Washington prophesies in a new publication of the American Geographical Society.

Dr. Antevs has made a special study of climatic cycles that swing over long periods of time. He finds that the down-curve in Far Western rainfall has already begun, and states that it is due to reach its climax in a terrific drought about ten years hence.

The region for which Dr. Antevs makes his forecast lies between the Wasatch mountains and the Sierras, comprising a total of about 175,000 square miles in the states of California, Nevada, Utah, Idaho, and Oregon. He feels that farmers and stockmen in this region should make long-range plans to meet the situation.

Science News Letter, February 12, 1938

BIOGRAPHY

American Institute Medal Awarded to Dr. Crocker

THE GOLD medal of the American Institute was awarded to Dr. William H. Crocker, director of the Boyce Thompson Institute for Plant Research at Yonkers, N. Y., at a dinner in New York City on the evening of Feb. 3.

The Institute, which for a century has fostered science and invention in New York City, also granted fellowship awards to Waldemar Kaempffert, science editor of the *New York Times* and to Dr. Raymond L. Ditmars, veteran curator of mammals and reptiles of the New York Zoological Gardens.

Dr. Crocker received the gold medal for his contributions to the knowledge of life processes in plants and his leadership of research at the Boyce Thompson Institute. Mr. Kaempffert, who is also president of the National Association of Science Writers, received his fellowship award for "his scholarly interpretation of scientific advances and for his editorial wisdom." Dr. Ditmars, who is widely known for his popular books on reptiles and other animals, was granted his fellowship award for "his 37 years of distinguished service in the care, understanding and interpretation of the reptile world."

Science News Letter, February 12, 1938

PHYSICS

New Electron Furnace Heats to 4500° F., Half as Hot as Sun

Bombardment With Streams of Electrons Melts Iridium, Platinum, and Other Refractory Metals

A SCIENTIFIC furnace that utilizes electron bombardments to produce temperatures up to 4500 degrees Fahrenheit, half as hot as the sun, is being used at the Harvard graduate school of engineering to study the basic physical properties and possible industrial uses of 40 metals at present little understood and used.

In announcing the research program Harvard scientists pointed out that of the 55 metallic groups only 15 have been fully utilized by industry. From ancient times gold, silver, iron, copper, tin, zinc, lead and mercury have served in many ways. Within more recent years aluminum, antimony, bismuth, cadmium, chromium, cobalt and nickel groups have been added to the earlier list.

But there still remain 40 metal groups, whose alloy characteristics have yet to be studied, and whose possible industrial application is still in its infancy. Their development, scientists say, may mean as much to industry as the relatively recent development of such alloys as stainless steel, or the tungsten carbide used in high speed machinery.

The new furnace was invented by Dr. Ralph R. Hultgren, instructor in metallurgy, who has been constructing the apparatus during the past year. Chief feature of the new equipment is its ability to eliminate entirely the contamination, by carbon or other metals, which has marked other furnaces. The familiar carbon arc, for example, reaches as high temperatures as the electron furnace but is markedly inferior as an experimental device because carbon gets into the melted metal, and there is no way of keeping it out.

Much higher temperatures than 4500 degrees could easily be reached by the Harvard apparatus if better crucibles could be obtained to hold the metals under study.

Vanadium, titanium, columbium, zirconium and the platinum group, which have been very difficult to study previously because of their relatively high melting points, are among the rarer metals which the new furnace can melt into very pure alloys.

The electron bombardment principle which underlies the new apparatus has previously been utilized by scientists for intense heat in several other fields but the Harvard furnace marks its first application to metallurgy.

Experimental tests already conducted have witnessed the successful melting of iridium at 4230 degrees Fahrenheit, platinum at 3200 degrees, and palladium at 2790 degrees. Ruthenium was heated to 4400 degrees and while it "sintered" a little, it did not melt.

These preliminary experiments indicate that only six of the 55 metallic elements have melting points beyond the reach of the Harvard apparatus in its present state. These are carbon, melting at 6300 degrees Fahrenheit; tungsten at 6066 degrees; rhenium at 5400 degrees, tantalum at 5130 degrees, osmium at 4860 degrees and molybdenum at 4716 degrees.

The new furnace consists of a small cylindrical metal cup or crucible, about a half inch in diameter and height, and two filament wires on opposite sides of the crucible. The metal to be studied is placed in this cup and an airtight cylindrical hood, about 10 inches in diameter and 15 inches high, is placed over all the apparatus. A powerful vacuum pump reduces the pressure under this hood to about one billionth of ordinary atmospheric pressure.

The crucible is then raised to an electrical potential of 2500 volts. As in the ordinary vacuum tube, this causes electrons to flow from the wire filaments across the vacuum gap to strike the crucible.

The heat of the furnace is built up by the energy of these electrons, converted into heat upon hitting the crucible; a conversion precisely similar to the production of heat by hammering metal. Although the energy of each individual electron is infinitesimal, the cumulative pounding of millions of them attracted by the crucible charge produces intense heat.

Science News Letter, February 12, 1938

MATHEMATICS

Googol? It's a New Word For Larger Vocabularies

WHAT is a googol? No, you are not really supposed to know, but it is the new name for a very large number that arose out of the collaboration of an eminent mathematician with a kindergarten.

Prof. Edward Kasner, Columbia University mathematician, was lecturing on graduate mathematics to kindergarten children (and they understood every word, he claims). It was raining, and he asked the children how many raindrops would fall on New York. The highest answer was a hundred. They had never counted higher than that.

Great, but Finite

But how many raindrops hit the roof and how many hit New York? Prof. Kasner asked. How many single raindrops hit all New York in 24 hours? Professor and children decided that the number of grains of sand on Coney Island beach was about the same as the number of raindrops. They all agreed that it was finitely countable, not infinite.

That is where the googol came into the story which Prof. Kasner tells in an amusing article in *Scripta Mathematica*.

A googol is a 1, followed by a hundred zeros. Here it is (if the typesetter doesn't make a mistake): 10000000000-000000000000000000000000000000000000 000000000000000000 00000000000000000000 000000000000000000. It is just larger than the largest numbers that are used in physics and astronomy. Eddington estimates the universe's electrons to number one with 79 zeros.

Subgoogolic Finance

The largest number that Prof. Kasner has seen in finance represented the amount of money—in marks—in circulation in Germany at the peak of the inflation. It was 496585346000000000000, according to a professor of economics. It was less than a googol.

Those grains of sand at Coney mount up to almost the same number, 1 followed by twenty zeros.

A larger number? Prof. Kasner has a name for it—googolplex. A googolplex is one with so many zeros that the number of zeros is a googol, that is, 1 with a googol of zeros.

Science News Letter, February 12, 1938

Night driving rates about four times as dangerous as driving in the day.

STILL MORE COAL WILL BE NEEDED

Used much more scientifically and economically than at present, coal will be in demand in ever-increasing amounts, especially when it really begins to figure as industrial raw material as well as fuel.

MINING

Coal is Still Power King; Chemical Career Ahead

COAL is still power king and is the energy source upon which the future must rely, despite the relative decrease in its use that has occurred in recent years.

Natural supplies of oil and gas and the electricity that comes from water power will not in future years supply our needs. Technical experts look forward to the day when coal will supply us not only with the bulk of our power from central stations but with superior synthetic fuels, such as gas for heating, liquid fuels for internal combustion engines, and smokeless solid fuel for home heating.

Inevitably an end to flush production of petroleum and natural gas will arrive, not suddenly but gradually and steadily, a survey made by the Ontario Research Foundation shows. This will be due both to enforced conservation measures and to changes in the economics of the industry. Synthetic manufacture of oil and gas from coal will become more economically justified with increased cost of natural oil and gas. Relatively less coal will be burned raw.

Even now figures show that almost a third of the bituminous coal produced in America is processed. A single coking plant near Pittsburgh consumed one per cent. of all the coal mined in the whole world.

Processing of coal, taking out the rich chemicals that dye our textiles, make our medicines, supply raw materials for industries, creating gaseous and liquid fuels, and leaving coke for metallurgical and other uses, will inevitably become one of the largest of our industries.

Science News Letter, February 12, 1938

RADIO

Towers Reach Skyward To Start Radio Waves

See Front Cover

BABEL'S Tower, we are told, was started by ambitious sons of men who wanted to reach the sky. It ended in frustration and a confusion of tongues. Modern towers of science reach higher than the builders of Babel probably ever dreamed of going, yet their modest ambition is only to give unconfused tongues a good jumping-off place for long journeys beneath the sky. KDKA's new tower, shown on the front cover, was run up to 718 feet by its daring riggers before they called it a day; its voice goes round the world.

Science News Letter, February 12, 1938

CHEMISTRY

Differently Charged Ions Separated on "Treadmill"

Those With Single Charges Held Stationary by Current While Those With Double Charges Hasten Their Journey

A TREADMILL for ions is the latest device for separating molecular solutions. Such a treadmill apparatus is now being imported from Sweden for use at the Biochemical Research Foundation of the Franklin Institute, reports Dr. Ellice McDonald, director.

One of the important problems of biochemistry, said Dr. McDonald, is to determine the number of constituents in a biological solution and separate them for analysis. Where these constituents have the same molecular weight the problem has been a baffling one for scientists.

The new apparatus being built in the laboratories of Dr. Thé Svedberg, Swedish Nobelist, effects the separation of such solutions if the molecules in it have different electrical charges on them, even though they have like molecular weights.

In the apparatus an electrical voltage is applied across the solution containing the molecules to be separated. This voltage makes the electrically-charged molecules start to migrate toward the terminals at either end; positively charged molecules move to the negative terminal and negatively charged ones to the positive terminal.

The trick in the new apparatus is to make the solution flow through the apparatus at exactly the same speed but in the opposite direction to those molecules which have, say, a single electric charge. Thus these molecules actually seem to stand still in the same way that a man walking on a treadmill can "stand still" even though his legs are moving rapidly.

However, a molecule having two electrical charges will "run" faster than the one with a single charge. Thus, this latter molecule will be able to buck the current and eventually reach its goal at the terminal. There it, and the millions of other similar ones which are doing the same thing, are drawn off and effectively separated from other molecules having only a single charge.

Describing the working of the apparatus, Dr. McDonald said:

"Suppose our treadmill is large enough to allow two men to move freely on it. If one of them is capable of walking in the same direction but slightly faster than the other, they will in walking be separated from each other, even though they remain on the treadmill because its motion opposes theirs."

Science News Letter, February 12, 1938

PHOTOGRAPHY

Color Films Introduced For Use in All Cameras

COLOR photography by which the amateur can take pictures in his own cheap camera and obtain prints in colors is coming out of the laboratories of scientists and professional photographers and becoming available for general use.

Dufaycolor, Inc., have announced that their color film is now going on nationwide sale in all sizes for use in almost any size and style of camera, from the popular miniature models to the large ones using 8 by 10 inch plates.

The cost of the film was not announced but it will be higher than ordinary black and white because the sales price will include cost of development of the film. The cost of color prints will depend on the volume of business handled by the special processing factory now being planned by Dufay. At present a print 2¼ by 3¼ inches costs 70 cents.

Agfa Ansco is known to be working on a color process film for amateurs in their laboratories. While the details have been secret it is known that Agfa has two goals: (1) a fast film equal in exposure speed to present black and white, and (2) a film which can be developed and processed by any amateur instead of at the factory.

Science News Letter, February 12, 1938

ARCHAEOLOGY

Oracle Had Speaking Tube In Ancient Syrian Chapel

A PAGAN chapel, equipped with a speaking tube for an oracle, has been discovered in ruins of 2300 B. C., in northern Syria.

The chapel is a discovery of a joint expedition of the British Museum and the British School of Archaeology at the mound called Tell Barak.

A hole in the clay, semi-circular altar in the chapel was traced by the archaeologists as leading to an adjoining hidden room, where a priest might hide and whisper through the tube.

A vase shaped like a comic head of a tramp is another notable discovery. This clay head, dating from 1500 B. C., has pop-eyes, a smirking mouth and a painted stubble beard.

Science News Letter, February 12, 1938

FLORICULTURE

NATURE RAMBLINGS
by Frank Thone

Indoor Oases

POTTED plants, that make little oases of green and bloom for us while winter desolation rules out of doors, must meet oasis conditions in our indoor ecology. Plants of desert oases are typically those that have moist, or even saturated, soil about their roots but exceedingly dry air about their leaves. Yet they are able to survive occasional soil droughts, too.

That is just about the kind of conditions we give our house plants. Habitually we over-water them, making the soil in their pots a swampy muck. Then once in a while we neglect them, letting them dry out. And all the while we keep the house air excessively dry, with temperature ranges from warm in the day to cool or even cold at night—just what desert plants get from desert air.

For this reason, plants that thrive best under average house conditions are either downright desert genera, like century plant, cactus, aloe, and other succulents; or they are plants of semi-desert habit, with thick, half-succulent stems, thick, leathery leaves, or other adaptations to intermittent water supply and incessant high evaporating power of the air.

Thus, the common geraniums store a good deal of water in their thick stems, and can reduce their evaporating surfaces on short notice by losing leaves, apparently without embarrassment, to grow new ones when conditions improve.

The leathery-leafed resistance to evaporation (sclerophylly, ecologists call it) is displayed by that old-time apartment favorite, the rubber tree, and by the oleander that our grandmothers loved. A little less pronounced, but still in the sclerophyll class, are the dwarf potted citrus plants now rather fashionable. Intermediate between this class and the succulents are the inevitable aspidistra of British households and its American equivalent, the sanseveria.

Perhaps the most perfect example of the oasis plant growing in our houses is the umbrella plant. It thrives when its roots are kept continually soaked, even when it is used as a goldfish-bowl plant. This is because in its native habitat it is a plant of lake and river margins, with its toes in the oozy mud and its head in the sun-parched air. No wonder it is able to stand up in modern houses and apartments, and "take it!"

Science News Letter, February 12, 1938

RADIO

Feb. 17, 4:00 p. m., E.S.T.

OLDEST CITY IN THE WORLD—Prof. E. A. Speiser of the University of Pennsylvania.

Feb. 24, 4:00 p. m., E.S.T.

NEWS ABOUT HELIUM—R. A. Cattell of the U. S. Bureau of Mines.

In the Science Service series of radio discussions led by Watson Davis, Director, over the Columbia Broadcasting System.

GEOLOGY

River Took Hardest Way, Formed Yellowstone Canyon

MILLIONS of years ago, a river in the Northwest took the "hard way." As a result, today millions of tourists stand in awe, every summer, gazing into the pastel-tinted Grand Canyon of the Yellowstone.

The tale is told by Prof. Arthur David Howard of New York University, in a newly published report to the Geological Society of America.

The Yellowstone river has its source in Lake Yellowstone, which lies right up against the Continental Divide, in the great national park of the same name. The river flows first north, then west, cutting deeply through a couple of mountain ranges, finally joining the Missouri at Ft. Union on the eastern boundary of Montana. Thence its waters continue their long journey toward the Gulf of Mexico.

At the southern end of Yellowstone lake, the Continental Divide is not at all the place of rocky steepness its name might suggest. There is a very wide pass —so wide and flat, indeed, that its floor is a wet meadow most of the spring and that eventually reach the Pacific, by a much easier route. Why did the river take the more difficult way?

The paradox is only apparent. Yellowstone waters also flow downhill; and downhill, in the early days of the river, was toward the north. The mountains were still a-making, and as they rose the river cut through and kept a way open.

During the pleistocene Ice Age, glaciers apparently blocked the northern drainage one or more times, and the lake did then overflow the divide and drain toward the Pacific. But when the age-long ice-jam went out, it resumed its northerly flow.

The river has not kept in the same channel all the time, Prof. Howard found. He confirmed the observations of other geologists who studied the terrain before him, that there is an old channel of pre-Ice Age date, high on the uplands above the present gorge bottom. He also describes a second channel, proved to be of Ice-Age date by sediments of that age found in it. The river now occupies a third, comparatively new channel.

Science News Letter, February 12, 1938

FORESTRY

Incendiary Forest Fires Outnumber Smokers' Blazes

FIRES purposely started in the forest by incendiaries outnumber even those caused by careless smokers throwing away lighted matches and cigarette stubs, the U. S. Forest Service reports. Incendiary origin accounted for 26 per cent. of all forest fires recorded in 1936, smokers for 24 per cent.

In total damage the incendiary fires ran far ahead of those caused by smokers: 41 per cent. as compared with 10. This is attributed to the fact that the smoker's blazes start in very casual fashion, usually near trails where they are easy to detect and put out. Incendiaries, on the other hand, operate cunningly and in secret as criminals usually do, setting their fires in such places and at such times as to cause maximum damage before they are detected.

Science News Letter, February 12, 1938

The earliest prehistoric artists drew pictures of animals mainly, and some of human figures, but rarely included plants in their art.

•First Glances at New Books

Additional Reviews On Page 112

Chemistry and Physics

HANDBOOK OF CHEMISTRY AND PHYSICS: A READY REFERENCE BOOK OF CHEMICAL AND PHYSICAL DATA (22nd ed.)—Charles D. Hodgman, ed.—*Chemical Rubber Publishing Co.*, 2069 p., $6, foreign, $6.50. To students and scientists in physics and chemistry this handbook has almost reached the enviable prestige of simply becoming known as The Handbook. Numerous revisions have been made to bring the volume up to date. New arrangements of old material have allowed condensations of space that culminate in a total increase of only 50 pages.

Science News Letter, February 12, 1938

Radio

DICTIONARY OF RADIO TERMINOLOGY IN THE ENGLISH, GERMAN, FRENCH AND RUSSIAN LANGUAGES—A. S. Litvinenko; ed. by V. I. Bashenoff—*Bookniga Corp.*, 560 p., $4. Printed in Moscow is this valuable reference work in the field of radio terminology.

Science News Letter, February 12, 1938

Television

TELEVISION ENGINEERING—J. C. Wilson—*Pitman Publishing Corporation*, 492 p., illus., $10. A comprehensive survey of television engineering from simple questions of optics through to the complicated transmission problems of modern television. Written by a British member of the Columbia Broadcasting Company staff, Mr. Wilson's book has as one of its chief virtues the fact that it considers the development of television in all the chief centers, not only in one particular nation.

Science News Letter, February 12, 1938

Geology

LANDSLIDES AND RELATED PHENOMENA, A STUDY OF MASS-MOVEMENTS OF SOIL AND ROCK—C. F. Stewart Sharpe—*Columbia Univ. Press*, 137 p., $3. A workmanlike technical presentation of a hitherto unclassified group of natural phenomena. Well indexed, with fair illustrations and excellent text, this book should be in every geological and geographical reference library.

Science News Letter, February 12, 1938

Geography

GEOGRAPHY FOR TODAY. BOOK II: THE SOUTHERN CONTINENTS — *Longmans, Green*, 404 p., illus., $2. Australia, New Zealand, South Africa and South America, are clearly described in this well-illustrated textbook. Telling how these areas were discovered, in addition to what is there today, this work should give the average student a good knowledge of the southern continents.

Science News Letter, February 12, 1938

Travel

THE LADY AND THE PANDA — Ruth Harkness—*Carrick and Evans*, 288 p., $2.50. A "bring-back-alive" narrative that starts on the Roof of the World and ends in the suburbs of Chicago, with the principal characters one very determined and resourceful young woman and one very strange but very appealing young animal. Lots of striking pictures.

Science News Letter, February 12, 1938

Biochemistry

BIOLOGICAL AND CLINICAL CHEMISTRY —Matthew Steel—*Lea & Febiger*, 770 p., $8. A new textbook with emphasis on the practical or clinical application of modern biochemical knowledge, the student learning various clinical tests by making them on himself.

Science News Letter, February 12, 1938

Nutrition

MODERN DIETARY TREATMENT—Margery Abrahams and Elsie M. Widdowson —*William Wood*, 328 p., $3.25. A practical book designed to aid physicians, nurses and dietitians in planning special diets.

Science News Letter, February 12, 1938

Physiology

A MONOGRAPH ON VEINS—Kenneth J. Franklin—*Charles C. Thomas*, 410 p., illus., $6. A technical book for physicians and other medical scientists. The author is tutor and lecturer in physiology at Oriel College, Oxford.

Science News Letter, February 12, 1938

Health—Advertising

POISONS, POTIONS AND PROFITS; THE ANTIDOTE TO RADIO ADVERTISING—Peter Morell—*Knight Publishers*, 292 p., $2. Radio-advertised beauty and health products come in for stern criticism and debunking in this volume.

Science News Letter, February 12, 1938

Chemistry

VISUALIZED CHEMISTRY—William Lemkin—*Oxford Book Co.*, 328 p., Paper, 68 c., cloth $1.12; school price, paper, 51 c., cloth, 84 c. Concise arrangement and excellent diagrams make this little text an admirable one for review in high school chemistry. However, it is not solely a review text for it fully meets College Entrance Examination Board requirements.

Science News Letter, February 12, 1938

Anthropology

SOURCE BOOK OF AFRICAN ANTHROPOLOGY—Wilfred D. Hamby—*Field Museum of Natural History*, 2 vols., 953 p., illus., $6. per volume. Dr. Hamby had a big problem in cramming the most important facts about Africa into less than a thousand pages. The result is a remarkable "introductory textbook," intended to give students some idea of the geography, biology, history and ethnology of Africa, and fulfilling its purpose admirably. Bibliographies alone fill about 140 pages, and there are over 100 illustrations, maps, and tables.

Science News Letter, February 12, 1938

Medicine—Biography

HARLOW BROOKS, MAN AND DOCTOR—John J. Moorhead—*Harper*, 302 p., illus., $3.50. Interesting not only because it relates the history of an eminent physician but also for the picture it gives of medical and non-medical life in New York from the gay nineties to the present time.

Science News Letter, February 12, 1938

Ichthyology

THE SMALL-MOUTHED BASS—Carl L. Hubbs and Reeve M. Bailey—*Cranbrook Inst. of Sci.*, 92 p., illus., 75 c. An account of a favorite game fish, intelligible to the average fisherman, yet containing plenty of information for the student and field naturalist.

Science News Letter, February 12, 1938

Psychology

PERSONALITY, A PSYCHOLOGICAL INTERPRETATION—Gordon W. Allport—*Holt*, 588 p., $3.50. This is a textbook discussing the development, structure, analysis, and understanding of personality by an associate professor of psychology at Harvard University.

Science News Letter, February 12, 1938

Social Science—Education

SOCIAL STUDY IN THE ELEMENTARY SCHOOL—John Schwarz—*Prentice-Hall*, 215 p., $2.25. A book for teachers from the State University, Bowling Green, Ohio.

Science News Letter, February 12, 1938

Physiology

HEALTH (3d ed.)—C. E. Turner and Georgie B. Collins—*Heath*, 231 p., illus., 72 c.

Science News Letter, February 12, 1938

Physiology

CLEANLINESS AND HEALTH (3d ed.)—C. E. Turner and Georgie B. Collins—*Heath*, 236 p., illus., 80 c.

Science News Letter, February 12, 1938

•First Glances at New Books

Additional Reviews On Page 111

Paleontology

LIFE LONG AGO: THE STORY OF FOSSILS—Carroll Lane Fenton—*Reynal & Hitchcock,* 287 p., illus., $3.50. Dr. Fenton is a paleontologist with imagination plus artistic ability. He presents us here with a book of which he has not only written the highly readable text but for which he has made all the very lively line drawings. The result is just about the best popular paleontology volume now in the field. Although it was prepared with a junior audience particularly in mind, it is certain that Junior's parents will not let the younger generation have a monopoly of such a good thing.

Science News Letter, February 12, 1938

Physics

LOW TEMPERATURE PHYSICS—M. and B. Ruhemann—*Cambridge (Macmillan),* 313 p., $5. An excellent book, written for the professional physicist who is not an expert in the field of low temperature, and for students of physics who have not yet concentrated on one particular branch of study. For other scientists the book has interest because it comes from the new laboratory of the U.S.S.R. headed by Prof. Kapitza. Material thus appears which is not easily available in the literature. The extensive biblography, which brings readers up to May 1937, is valuable for its wide coverage of the Russian references.

Science News Letter, February 12, 1938

Photography

U. S. CAMERA, 1937—T. J. Maloney—*William Morrow,* 226 p., $2.90. A selected group of contemporary photographs together with a few of historic interest. Several color photographs are included. A ring binder facilitates study of the pictures.

Science News Letter, February 12, 1938

Geography

ECONOMIC GEOGRAPHY MANUAL—Nels A. Bengston and Vera E. Rigdon—*Prentice-Hall,* 177 p., $1.50.

Science News Letter, February 12, 1938

Physiology

POISONING THE PUBLIC: DAILY CONTACTS WITH TOXIC MATERIALS AS CIVILIZATION MARCHES ON—Russell C. Erb.—*Dorrance,* 219 p., $2. The title indicates a conspiracy on the part of someone to do us all in; but the wholesale poisoning, it turns out, is being done not by some arch enemy but by a lot of things including the daily job, the air we breathe, the black widow spider and the diamond-back rattler (with which latter two toxic materials all of us of course have daily contacts). Incidentally the author claims in his introduction that he is "no alarmist." Timid readers might well keep firmly in mind the final phrase of the title.

Science News Letter, February 12, 1938

Sociology

THE MARGINAL MAN: A STUDY IN PERSONALITY AND CULTURE CONFLICT—Everett V. Stonequist—*Scribner's,* 228 p., $1.60. Dr. Stonequist omits, in his short study, the truly tragic racial and cultural conflicts now occurring between the whites, Indians, and mixed-bloods in the American Southwest. Rather thought-provoking are the descriptions of the status of the racial and cultural hybrids in various parts of the world.

Science News Letter, February 12, 1938

Physiology

THE THINKING BODY: A STUDY OF THE BALANCING FORCES OF DYNAMIC MAN—Mabel Elsworth Todd—*Paul B. Hoeber,* 314 p., illus., $4. Body mechanics, particularly as related to posture and locomotion, are described in the first part of the book. In the second part the author gives her views of how to use the body efficiently.

Science News Letter, February 12, 1938

Chemistry

AN ELEMENTARY COURSE IN QUALITATIVE ANALYSIS—William L. Evans, Jesse E. Day and A. B. Garrett—*Ginn,* 234 p., $2. Ohio State University chemists present a revision and elaboration of Dean William McPherson's well-known laboratory manual. The present work is printed but bound in loose leaf style.

Science News Letter, February 12, 1938

Physics

A TEXT-BOOK OF LIGHT—G. R. Noakes—*Macmillan,* 355 p., $2.25. British elementary text which would find American use in colleges because it uses calculus throughout. Many problems will prove most helpful to the serious student and his teacher.

Science News Letter, February 12, 1938

Aviation

HEROES OF THE AIR (Rev. ed.)—Chelsea Fraser—*Crowell,* 808 p., $2.50. Since 1926 editions of this popular book have been appearing. Each time the recent achievements of aviation have been added to keep the book an up-to-date source of information on the outstanding flights. Well-drawn maps by the author supply illustration.

Science News Letter, February 12, 1938

Pyrotechny

DICTIONARY AND MANUAL OF FIREWORKS—George W. Weingart—*Bruce Humphries,* 176 p., $3. With increasingly rigid prohibition of fireworks on the Fourth of July (and Christmas in the South), the rising generation is being guarded against injury but is missing something of the dangerous thrill which grown-folks enjoyed in their youth. Fireworks and their fabrication have always been something of a mystery to the layman who lights the rocket, firecracker or pinwheel and then jumps back to enjoy the spectacle and sound. In this book the author, a veteran fireworks manufacturer, gives the formula for a multitude of different effects, many of them trade secrets or private inventions of his own. Fathers with a chemical turn of mind, who get hold of this book may be expected to do some experimenting of their own next summer. But what the National Safety Council will think of it is something else.

Science News Letter, February 12, 1938

Parapsychology

EXPERIMENTAL SET FOR TESTING EXTRA-SENSORY PERCEPTION: Handbook for Testing Extra-sensory Perception—C. E. Stuart and J. G. Pratt, 98 p., Record pad, and 2 packs of ESP cards—*Farrar and Rinehart,* $1.75 per set.

Science News Letter, February 12, 1938

Geology

HISTORY OF THE GRAND CANYON OF THE YELLOWSTONE—Arthur David Howard—*Geological Soc. of America,* 159 p., illus., map., $1.50. (See page 110)

Science News Letter, February 12, 1938

Health

40,000,000 GUINEA PIG CHILDREN—Rachel Lynn Palmer and Isadore M. Alpher—*Vanguard,* 249 p., $2. This volume undertakes to point out the perils to which the authors believe children are subjected by certain forms of national advertising.

Science News Letter, February 12, 1938

Organic Chemistry

THE CARBON COMPOUNDS. A TEXT-BOOK OF ORGANIC CHEMISTRY (3rd rev. ed.)—C. W. Porter—*Ginn,* 495 p., $4. University of California text which is widely known because its frequent revisions keep it abreast of the advances in chemistry. The book has three main divisions: (1) aliphatic series of compounds, (2) the aromatic series and (3) important general organic reactions.

Science News Letter, February 12, 1938